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ABSTRACT

The social, behavioral, and physiological effects of episodic crowding on children and elderly adults are reported in this paper. Children ranging in ages from 9 to 16 and elderly adults ranging in ages from 60 to 90 were grouped by age into small and large rooms. Each group sat silently for 30 minutes in the rooms while skin conductance equipment measured their level of stress. The results indicated that crowded children had greater increases in stress than did their uncrowded peers. Both boys and girls reported great discomfort from the physical proximity of others in the crowded room and expressed greater feelings of annoyance following crowding. In contrast, elderly adults in the crowded room did not indicate feeling confined but regarded their room as cozier than did the uncrowded subjects. These subjects felt less aggressive, less afraid, less scrutinized, and friendlier in the crowded room. In addition, the adults in the crowded room characterized members of their group in a more positive light than did those in the uncrowded room. The implications of these findings on housing for the elderly are mentioned. (Author/DE)

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EFFECTS OF EPISODIC CROWDING: A DEVELOPMENTAL PERSPECTIVE

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Recent research on crowding has concentrated on the basic question of whether crowding has costs for humans. The popular literature has always assumed that crowding has costs; that it leads to increases in crime, violence, and assorted other social and psychological pathologies. Early evidence from the animal research clearly supported this view. Calhoun (1962) and Christian, Flyger and Davis (1961) and a host of other researchers have shown the rather devestating effects of crowding on infra-human populations. However, early reports from laboratory studies on the effects of human crowding indicated that crowding does not cause clear and consistent effects. Recent studies have found that crowding has a number of effects on humans.

The effects of crowding can be seen in three major aspects of urban life: residences, overmanned public places and public transportation facilities. Turning first to residence; the effects of crowding of this kind have been studied by Aiello, Epstein and Karlin (1975), Valins and Baum (1974), Baron et al. (1975), Smith and Haythorne (1972) and McDonald and Cden (1973). The effects of residential crowding apparently involve a generalized pattern of avoidence by persons who adapt successfully to the crowded environment. Continued maintenance of high interaction levels is relatively rare (of. Valins and Baum, 1974); further, high interaction levels are detrimental to psychological and physical well-being and living arrangement stability (Aiello, Epstein and Karlin, 1975).

Second, crowding in overmanned environments has been studied by Wicker et al. (1974). This conceptual framework is useful in considering the research of Rall and Saegert (1974), Dooley (1974) and Stokols (1976) among others. This literature seems to show that crowding is to some degree stressful when a large number of non-participants "overman" a setting. Overmanning by participants on the other hand does not seem to have such clear effects. That is, in settings such as department stores, railroad stations, etc., crowded consumers tend to show evidence of stress on such measures as the Stroop Color Test and on measures of self-manipulation. On the other hand, the studies of Wicker et al. (1972) show very few effects

for too great a number of participants.

Finally, the effects of episodic crowding have been studied in laboratory settings; settings which resemble, conceptually, transportation facilities in urban life. While crowding in laboratories has not attempted to stimulate crowding in any one aspect of urban life, it more closely resembles transportation crowding than either crowding in residences or in overmanned public environments. The effects of episodic crowding may be summarized as follows: crowding is frequently arousing. The social effects of crowding are mediated by a variety of factors. Personality variables, sex of subject, tasks, level and type of proxemic interaction, degree of social stimulation, definition of the situation, and previling norms are some of the variables which demonstratably influence the effects of episodic crowding. For example, in short term crowding situations, adult women usually display a cooperative interdependent style while adult men tend to display a more individualistic independent style. This effect may, however, be reversed when a task requiring the formation of an achievement oriented team is used. In these circumstances, men become more cohesive while women become less cohesive. In addition, by changing the prevailing norms about interaction or by blocking interaction channels, the effects of episodic crowding may also be systematically changed. Three recent studies conducted in our laboratory have additionally demonstrated the stressful effects of proximity. Eye contact and bodily contact appear particularly important in producing stress, especially for those preferring greater interaction distances (see Aiello, DeRisi, Epstein, and Karlin, 1976). In one study (Kim, Mangus, Aiello, Karlin and Epstein, 1976) crowded subjects' ability to see one another was manipulated. Results indicated that stress, as measured by skill conductance level, was reduced when subjects could not see one another and this effect was stronger for men than it was for women. Sundstrom (1976) also investigated the nonverbal concomitants of crowding related stress. He found that males who were touched and stared at experienced high initial levels of stress which decreased over time. Finally, Worchel and Teddlie (1976) found that the stressful effects of close physical proximity could be ameliorated by providing subjects with distractors.

Few studies however have investigated how an individual's age may mediate

the experience of a short-term crowding situation (see Hutt and Vaizey, 1966; Loo, 1972; Price, 1971; Rohe and Patterson, 1974). Interaction distance preferences have been found to vary with age; young children (Aiello and Aiello, 1974; Price and Dabbs, 1974) and the elderly (DeLong, 1970) interact at much closer distances than do young and middle-age adults. Might these groups therefore be less negatively affected by crowding? Consistent with our recommendation for crowding research that uses several levels of analysis (Aiello, Epstein and Karlin, 1974, 1975), the present report will consider the social, behavioral and physiological responses of subjects ranging in age from nine to ninety, who were exposed to episodic crowding.

STUDY 1: Effects of episodic crowding on children

Method

Following a pretest of our instruments and procedures, a total of 184 children participated in the experiment: 44 fourth graders, 52 eighth graders and 88 eleventh graders. All session were conducted in the specially partitioned empty classrooms of the respective schools.

Children were run in sets of two same-sex groups of four. Eight minimally acquainted children were led from their classrooms to a briefing area to be prepared for the first phase of the study. While one experimenter attached Zinc-electrodes coated with a Zinc-Sulfate-Sodium-Chloride in "Unibase" mixture to the palmer surface of the middle finger of each child's non-preferred hand, a second experimenter explained the procedure to the children:

> We're going to ask you to participate in a series of activities today. We'd like you to wear these finger attachments. They won't hurt, they're just to help us with the activities. Please don't play with them as they're a bit delicate.
>
> If you do well at these activities, you can win coupons which can be traded for prizes at the end of the day. (Twinkies, Devil Dogs, etc. are shown on display). These are the cakes you can buy with your coupons.
>
> For the first activity, you are to try to sit as quietly as you can in a room until I return for you. In order to win, you mustn't stand up or talk to one another while you're in the room.
>
> If you can do all this, you will win five one-point coupons (coupons are shown) which can be traded later for prizes. Does anyone have any questions?

The children in their randomly determined groups of four were then led to either of two small (4ft. X 2 1/2ft.) or two large (10ft. X 12ft.) partitioned rooms. As each child sat down, his or her electrode was connected to the recording unit. The students were reminded to sit quietly and keep their hands with the "finger attachments" on their laps.

Since the measurement of SCL is subject to a variety of measurement artifacts (e.g. Montagu and Coles, 1966), care was taken throughout the course of the experiment to control room temperature and humidity, and to schedule experimental sessions at similar times of the day. In addition, the composition of the particular electrode pasts used minimized the possibility of any hydration artifact. For thirty minutes, the researchers took skin conductance measures on each child at intervals of 30 seconds. An occasional active student was asked again to sit quietly and reminded that the coupons will be awarded to those who follow the directions.

After thirty minutes, the researcher returned for one child at a time. Each, in turn, was led to the next area, where his skin conductance unit was removed and his coupons were tendered.

Half of the subjects then completed the post-experimental questionnaire assessings: their perception of the experimental environment and attraction to their group, self-reported somatic symptoms of stress, discomfort, and annoyance, and reactions to various phases of the experiment. The other half of the subjects were paired with a "like-badge numbered" subject from the group of which they were not a member. These students played Kagan and Madsen's (1971) "circle matrix board" game, a measure of cooperation-competition in which they could win additional coupons. When the children finished the one activity they were escorted to the other area to begin the second activity. When both tasks were completed the children redeemed the coupon(s) they had won for the cake prizes.

Results

As can be seen in Table 1 children at all three grade levels characterized the smaller room as: smaller ($F=135.86$, $df=1/171$, $p<.001$), having less room ($F=152.74$, $df=1/171$, $p<.001$), more crowded ($F=181$, $df=1/171$, $p<.001$) hotter ($F=17.94$, $df=1/171$, $p<.001$), and less comfortable ($F=10.80$, $df=1/171$, $p<.001$),

and less comfortable ($F=10.80$, $df=1/171$, $p<.005$), than the larger room. Clearly the crowding manipulation was effective.

Electrodermal Responses

One purpose of this study was to assess whether children would show similar physiological signs of stress over time that we have observed for adults in crowded environments (e.g. Aiello, Epstein and Karlin, 1975). Finding a significant main effect for grade level ($F=15.30$, $df=2/166$, $p<.001$), data for each of the three grades was analyzed separately in a 2 X 2 X 10 factorial ANOVA. The first factor was room size, the second was the sex of the subject and third was the repeated measure-trail block.

As can be seen in Figure 1 all groups of fourth grades have somewhat higher skin conductance levels over the thirty minutes of recording ($F=81.43$, $d=9/351$, $p<.001$). This effect is qualified by a significant interaction effect however. Subjects in the small room show greater and more rapid increases in conductance level than their counterparts in the large goom ($F=3.60$, $df=9/351$, $p<.001$) even at this young age level.
The physiological responses of eighth grade children are somewhat less straightforward, however, as can be observed in Figure 2. A significant main effect for time ($F=25.04$, $df=9/423$, $p<.001$) is qualified by a condition by time interaction ($F=25.04$, $df=9/423$, $p<.001$). Children in the larger room actually experience greater increases in SCL than those in the smaller room, a result primarily accounted for by the crowded females who remain at about the same conductance level.

Eleventh grade mean skin conductance level scores are presented in Figure 3. Once again the main effect of time reached significance ($F=56.63$, $df=9/720$, $p<.001$) but is qualified by the three-way interaction of room size X sex X time ($F=10.04$, $df=9/70$, $p<.001$). While males in the larger room do not show any increase in SCL over time, females in the small room go up a little and males in the small room and females in the large room increase considerably over the thirty minute period.

Post-experimental Questionnaire Responses

Three indices were created from the individual questions that students were asked to answer following the differential room size manipulation. Items within each of the three indices were highly correlated. The Proximity-

Discomfort Index consisted of items such as: Felt uncomfortable, felt squished, felt cramped, and others too close to me. Table 2 shows the significant main effect for room size across all grade levels; subjects in the small room report much greater discomfort as a function of the proximity of others than do those in the large room. At the fourth grade level this effect is modified somewhat by a room size by sex interaction ($F=4.28$, $df=1/40$, $p<.05$); crowded meales report the greatest discomfort, similar trends are apparent in the other grades although they do not reach significance.

The Annoyance Index was created from such items as: Felt angry, felt annoyed, felt unhappy, and felt like leaving. The room size effect again was significant ($F=19.31$, $df=1/172$, $p<.001$). Subjects in the small room felt more annoyed than those in the large room.

A final index of somatic-arousal was derived from items such as: Felt sweaty, felt fast heartbeat, felt nervous, and felt itchy. Only a significant grade level effect was found for this index ($F=9.18$, $df=2/172$, $p<.001$) with fourth graders reporting less arousal.

Social Behavior: Cooperation-Competition

The final measure examined the degree to which children would work cooperatively with a partner from outside of the group with which they experienced the room manipulation to win prizes. The size of the room that the children had been exposed to significantly affected their social behavior ($F=4.58$, $df=1/172$, $p<.05$). Children who had been crowded were more competitive than those who were not crowded. Further, males who had not been crowded were the most cooperative ($F=3.93$, $df=1/172$, $p<.05$); this effect was most pronounced for the eighth grade children.

Discussion

Taken together the data from the present experiment demonstrate that crowding can have consequences even for younger children, who are smaller in stature and who have smaller spatial preferences. Even at the youngest age level studied, nine years of age, crowded subject had greater increases in skin conductance level over time than did their noncrowded peers. It should

be noted that during adolescence females do appear to be somewhat less affected physiologically by crowding. All subject however, both boys and girls, reported greater discomfort from the physical proximity of others in the crowded room and expressed greater feelings of annoyance following crowding. Lastly, crowding led to greater competition among children, despite the fact that in terms of available prizes to win they nad all to gain from cooperating and nothing to lose.

Preliminary implications for design might include cautions against the creation of crowded environments that would be primarily occupied by male youngesters, as they seem to be most negatively affected.

STUDY 2: Effects of episodic crowding on the elderly

When we examine the literature concerning the effect of the environment on the elderly, we find that two opposing trends seem to have emerged. First, Lawton (Lawton, 1970; Lawton and Simon, 1968) has discussed what he calls the "environmental docility hypothesis". He claims that the behavior of the elderly is more dependent on the external environment due to reduced competence, Lawton feels that they are much more sensitive to changes in that environment. Several proximity studies (e.g., Friedman, 1966), as well as Sommer and Ross's (1958) study of seating arrangement in an old age home, all seem to support the view that the elderly have less power to overcome their physical environment. Extrapolating from Lawton's environmental docility hypothesis, one would expect an extremely negative reaction to crowding, on the part of the elderly, for they would be less able to cope with this stressful environment. Second, and in apparent contradiction to Lawton, DeLong (1970) has investigated the spatial behavior of a group of mentally-impaired elderly, and his findings indicate that they assume closer distances when interacting than do the young. Since they interact at closer distances, they would be expected to perceive a constant area as less crowded; these results, however, cannot in themselves support a similar hypothesis for normal elderly persons. Therefore, more important than DeLong's findings, is the knowledge that the elderly experience a decrease in sensory capabilities,

the general observation that they appear to rely more on bodily contact than younger adults, and also the view that there are fewer sanctions applied to this age group for breeching norms for appropriate interaction distances. Thus, if the elderly do interact at closer distances than younger adults, one would expect to find fewer negative reactions in the elderly, to an environment considered extremely "crowded" by the young. The two views are not necessarily mutually exclusive, however, it is posssible that much closer distances are necessary for the elderly than for younger adults to perceive the situation as crowded; but, once they do perceive the situation as such, perhaps they then experience even greater anxiety than does a younger person.

The first issue for the present study pertains to the elderly person's perception of crowding. Will the elderly exhibit differences in response to the two environments, the eight-by-eight foot chamber versus the four-by-four foot chamber? Possible differences will be investigated on three levels: (1) physiological responses; (2) questionnaire responses (phenomenological level); and (3) reactions to others as measured by the Tajfel task. Three dependent measures were employed for Aiello, Epstein and Karlin (1974, 1975) that have suggested that more than one level of analysis is necessary to demonstrate the existence of crowding.

The second issue surrounds the question of sex differences in the responses obtained for each of the three dpendent measures (physiological, questionnaire, and Tajfel measures). Past studies, which have involved the young, have found sex differences on all three measures, with males registering greater physiological arousal over time than females in both environments and displaying more negative reactions to the "crowded" experience in terms of questionnaire responses and Tajfel scores, which have indicated less group cohesiveness in males than in females. Studies of the elderly by Lipman (1961), Riley et al. (1969) and Cumming et al. (1960) however, have suggested that there may be a breakdown in sex-role differentiation in old age. These authors have found that there is a less clearcut distinction between the traditionally masculine versus feminine roles, the active versus passive roles, and instrumental versus expressive orientations. Do their findings indicate a generalized merging of the sexes in later life; that is, will their findings apply to the area of crowding and proxemics, as well as to areas already investigated? Such are the issues which the author has chosen to investigate.

METHOD

Subjects

The subjects were 56 elderly persons, 36 females and 20 males, aged 60 to 90. These subjects were divided into same-sexed groups of four per condition for each experimental session. All participants were members of various community groups, senior citizens' clubs, women's clubs, and church clubs, who volunteered to take part in a study which was "investigating the effects of environment on human behavior".

Apparatus

Since our research was conducted in the field, two partable, eight-by-eight foot wood panels were utilized to form the appropriate size chambers. Each panel could be folded in half to form two four foot panels at right angles to one another. In the crowded condition, one panel was folded to form such a right angle, and was joined to two existing walls that also formed a right angle; thus a four-by-four foot chamber was created. In the uncrowded condition, one eight foot apnel was used to partition an area that was approximately eight foot square. Using one panel for each condition enabled the experimenters to test the two conditions simultaneously; thus, eight subjects could be tested at one time, four per condition. If eight same-sexed volunteers were not available to test both conditions simultaneously, only one condition was tested. First, fewer than four persons could not be tested per condition, since it was essential for the number of subjects to be constant. Second, the experimenters felt that sex must be constant between groups, as well as within them, so that the Tajfel scores, which reflected subjects attitude toward his own group, could not be affected by the sex of the opposite group; for example, men might tend to be more favorable to the other group if they were females, regardless of how they felt toward their own group members.

There were four plastic molded chairs without armrests in each chamber and the distance between them was held constant throughout the experiment. In the small room, subjects sat in pairs facing one another, with the back of their chairs touching the wall behind them, one side touching the wall next to it, and the other side touching the chair beside it. In the large room, chairs were placed, also face-to-face in pairs, but in this

case they were five feet apart and seven feet across from one another. Distances from all four walls were equal for all subjects.

Two physiological units were constructed, one per condition. Each unit measured the level of skin conductance level for each of the four members of a group, as well as for the total group. The palmer surface of the third finger of each subjects' non-preferred hand was rubbed with acetone. Zinc electrodes were then coated with a Zinc—Sulfate-Sodium Chloride in "Unibase" mixture and fastened to each subject's appropriate finger (Aiello, Epstein and Karlin, 1975).

Procedure

The experiment itself consisted of two phases. In phase I, a measure of skin conductance level was obtained for each subject and for the total group while subjects were seated in their respective rooms; and in Phase II the Tajfel task and the questionnaire were administered. All experimenters used in the study were female. First, eight same-sexed volunteers were obtained from among the group of senior citizens. A screening procedure eliminated all those who knew one another very well, who had poor vision and would be unable to successfully complete the written portion of the experiment, or who were on tranquilizers and whose measures of skin conductance level could not be obtained. When eight permissable subjects were obtained, they were then randomly assigned to condition, the large or small room, and to seats within each condition. This was accomplished by having one of the two experimenters who conducted phase I ask subjects to take a badge from an envelope containing color coded badges, four red ones indicating the large room and four blue ones indicating the small room; each color badge had a number from one to four to indicate the particular seat within each condition. Subjects were then led to their respective rooms and seated according to the number appearing on their badges. At this point, subjects were asked for their watches with the reassurance that the watches would remain in safe keeping for them. It was explained to them that jewelry might interfere with the readings of skin conductance which the experimenters were trying to obtain. In addition, removal of watches prevented subjects from having an objective measure of the passage of time to refer to, which might influence their response level. After the watches were collected, the acetone was

applied and the zinc electrodes attached to the third finger of each subject's non-preferred hand. The following instructions were then read to the subjects:

> We are interested in studying the effects of different environments on physiological responses. There will be two parts to the study. First, you will spend time in this environment and we will measure your skin conductance. There is absolutely no danger in this procedure. Our research has shown that for greatest accuracy of recording, it is best if you remain seated and refrain from any talking. Please remember, no talking. We will be back when this phase of the study is over, and we will tell you what we would like you to do next.

Subjects were reassured that the electrodermal measure was not a dangerous one, to reduce the anxiety which might result from the novel situation itself. It was also emphasized that subjects were not to talk, so that greater control could be maintained over the variables being tested.

After reading the instructions, the experimenter left the room and entered a second room to take readings. After three minutes, the experimenter began to record responses in the following order: the total group response, the that of S1, S2, S3, and S4. Responses were recorded at fifteen second intervals, with the total recording time being fifteen minutes; thus, twelve responses were recorded for each subject and for the total group measure. These twelve responses were later divided into blocks of three, means were computed for each block, and then log transformations were performed on these three scores. At the end of the fifteen minute period, subjects were taken from the chamber and were led to a separate area for phase II of the experiment.

The above procedure applied to each condition, the large and the small rooms, and was performed in both rooms simultaneously except for times in which only four subjects were available. At the end of phase I, the four subjects from each group were taken to a single area for the completion of the study. At this time a third experimenter administered the Tajfel task and the questionnaire to all eight subjects. The Tajfel task, which was administered first, attempted to measure the individual's reaction to his group. Subjects were instructed to allot points to or take points away from a few anonymous members of the red and blue groups, each point having the

value of one tenth of a cent. For each pair of allocations, subjects were told to place a check mark over the appropriate box to indicate the two point values which they had selected for that set. There were a total of six pairs of allocations to be made, three of which called for the allocation of points to a member of the blue group and a member of the red group. These three allocations were those which were important for scoring purposes, in that the points allocated to one's own group on these three trials were summed, yielding a total score which could then be compared to that of other subjects. The higher the total of points allocated to one's own group, the greater the degree of group cohesiveness experienced by the individual. Those who allotted few points to their own group demonstrated little group cohesiveness, and, in effect, showed a more negative attitude toward the group experience in their particular experimental condition. Instances which necessitated the testing of four, rather than eight subjects, also required that the Tajfel directions be modified. Since two groups are essential for the Tajfel to be effective, in that points are assigned to members of two groups, these subjects were told that the same study was being conducted concurrently with a second group of same-sexed elderly subjects, by our colleagues at Douglass College. Members of this second group of subjects, involved in the same tasks as themselves, were those subjects for whom points would be allotted as well as to members of their own group.

Finally, upon completion of the Tajfel task subjects were asked to complete a questionnare, in which they were to rate, on a scale of one to nine, with nine as the highest rating, various reactions to the particular room in which they had been seated in phase I of the study, and to the other members of that group room. The experimenter read the questionnaire instructions aloud and encouraged subjects to ask for help if they had any difficulty reading the material although the questionnaire itself had been double spaced and consisted of all upper case letters for increased legibility.

Results

A two way analysis of variance was computed for each of the three levels of analysis: (1) the physiological skin conductance scores; (2) the Tajfel task, to measure group cohesiveness; and (3) the questionnaire, to measure

subject's social and psychological experience in each of their respective group rooms. The analysis of variance was computed for unequal N due to the difficulties in obtaining a sufficient number of subjects with the total number of subjects per cell being as follows: 20 crowded females subjects, 16 uncrowded females subjects, 12 crowded male subjects, and eight uncrowded male subjects.

As noted above, the twelve original electrodermal measurements for each subject were divided into three trial blocks; means were computed for each block, and log transformations performed on these means. Log transformed scores were then analyzed in a 2 X 2 X 3 analysis of variance, that of sex X room size X trial block. A significant main effect for trial block was found ($F=15.46$, $df=2/104$, $p<.01$) that is modified by the interaction effects of sex by trial ($F=4.49$, $df=2/104$, $p<.05$) and room size by trial ($F=3.00$, $df=2/104$, $p<.07$). Females increased more rapidly over time than did males. Further, as can be seen in Figure 4, a greater increase in arousal level was found to occur for crowded subjects than their noncrowded counterparts.

The remaining two levels of analysis, the questionnaire scores and the Tajfel task scores, provided additional information regarding the effect of sex and room-size. The first issue of concern in the present study questioned whether or not differences in response occurred as a function of room size. Subjects judged the four-by-four foot room to be smaller than the eigh-by-eight foot room, and in conjunction with this, subjects in the smaller room felt more "crowded" than those in the larger room; the $\bar{X}$s for "crowded" were 6.2 and 2.0 respectively ($F=34.50$, $df=1/52$, $p<.001$). Subjects in the crowded room felt less aggressive, less afraid, scrutinized less, and friendlier than subjects in the uncrowded room. The Tajfel data also revealed that crowded subjects expressed greater group cohesiveness than their non-crowded counterparts (CR=28.9, NC=24.5; $F=3.78$, $df=1/53$, $p<.06$). Other members of the group were perceived as more helping, friendlier, and kinder by subjects in the crowded room and perceived as colder and sadder by subjects in the uncrowded room.

The second issue of concern was that of possible sex differences in response to crowding among the elderly subjects. A small number of simple sex effects were also found to be significant. Females rated their group room as quieter than males; in addition, the inability to talk disturbed them more than it did males, while the amount of noise disturbed them less than males. Finall, males characterized other members of their group as more unlikeable and more aggressive than did females. Four responses were not in accordance with the above: males characterized their group members as more

similar to themselves than did females, characterized themselves as less irritated than females, and reported feeling both more relaxed and more excited than females (seemingly contradictory).

Discussion

Subjects judged the small room to be smaller than the large room, and in addition to perceiving their group room as smaller, the subjects in the smaller room did, in fact, perceive the environment as "crowded". Although subjects in the smaller room felt "crowded" they did not, however, feel that the experience was a "negative" one. They did not indicate feeling confined; in fact, crowded subjects regarded their group room as cozier than uncrowded subjects. Subjects felt less aggressive, less afraid, scrutinized less, and friendlier in the crowded room. In addition, those in the crowded room characterized other members in a more positive light than those in the uncrowded room. Others were perceived as more "helping", as friendlier, and as kinder in the crowded room; while uncrowded group members were viewed as colder and sadder. Smiling was also more commonly perceived as easing discomfort in the crowded room. Finally, scores on the Tajfel task were higher in the crowded than uncrowded room, indicating the subjects felt better towards other in the crowded groups. These results, taken together indicate that the "crowded" experience was not particularly aversive for the elderly subjects tested; in fact, it was viewed as somewhat more "positive" than the uncrowded experience. Nevertheless, the physiological data revealed that crowded men and women experienced greater increases in skin conductance level over time than did those subjects who had occupied the larger room.

The second set of results to be discussed are those pertaining to sex differences. Females, who typically engage in a greater amount of verbal behavior than males, viewed their group rooms as more quiet than males, and the inability to talk contributed to their discomfort more than males, as one might expect. Related to this, males reported that they were more disturbed by noise than were females. Males also characterized others as more unlikeable and more aggressive than females, consistant with previous reports of person perception. There is some data that seems to contradict this general overview of the elderly subject's experience. Males were found

to be less irritated than females. They were also more relaxed and more encouraged to show signs of discomfort. In addition, they reported feeling more excited than females. It is very possible that these inconsistencies may be the result of using female experimenters. Generally speaking, the males were much more responsive to the experimenters and in some cases, more cooperative than were females.

Finally, there were a number of significant interactions between room size and sex: (1) Males felt more uncomfortable in the crowded room, while females felt more uncomfortable in the uncrowded room; (2) males characterized the members of their group as more unfriendly in the crowded group, while females viewed other group members as more unfriendly in the uncrowded room; (3) when asked whether they wished to socialize with group members at a later date, males preferred to socialize with their own group more in the uncrowded room, while females preferred to socialize with their own group more in the crowded room and; (4) when asked to what extent subjects focused their attention on something other than how crowded they were, crowded females were found to have the lowest ratings, indicating that they found it less necessary to escape from the experimental condition than did the other three groups. Despite these differences, however, there does appear to be somewhat of a narrowing of sex differences in later life.

If the findings of future investigations are similar to the present findings, and the elderly are shown to prefer closer distances, to have a more positive orientation in a more "crowded" environment, architectural design and plans for housing of the elderly should base their proposals on what would be most comfortable for the inhabitants of the structures. Perhaps apartments for the elderly should consist of more numerous small, cozy rooms as opposed to one-room efficiency apartments, so that the elderly are provided with an environment suited to their own needs, one which allows for maximum growth and potential, which is the right of every individual regardless of his age, a right too often ignored. Before a step toward small, cozy apartments is taken however, more information is needed regarding additional physiological indicators of environmental stress on the elderly. It could prove extremely dangerous to limit the space utilized by the elderly if high levels of arousal result, since stress is so extremely dangerous in this later phase of life.

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TABLE 1

Mean room characterizations as a function of room size (not crowded (NC), and crowded (CR)) and grade level (fourth, eighth and eleventh).

		Large (1)- Small (7)	Lots of Room (1)- No Room (7)	Noncrowded (1)- Crowded (7)	Cold (1)- Hot (7)	Comfortable (1)- Not Comfortable (7)
4th Grade	NC	3.50	2.69	2.13	5.00	3.38
	CR	6.17	5.46	5.75	5.65	4.35
8th Grade	NC	5.46	3.63	2.86	3.67	4.48
	CR	6.44	5.72	5.85	4.50	5.22
11th Grade	NC	5.26	3.92	2.97	3.60	4.60
	CR	6.60	6.17	6.09	4.38	5.50

TABLE 2

Mean index scores of crowded (CR) and noncrowded (NC) male (M) and female (F) fourth, eight and eleventh grade children (N=184).

		Proximity-Discomfort Index		Annoyance Index		Somatic-Arousal Index	
		M	F	M	F	M	F
4th Grade	NC	5.68	5.46	5.86	5.96	4.48	4.31
	CR	3.55	4.73	4.74	5.66	3.84	4.20
8th Grade	NC	5.58	5.59	5.89	5.52	5.13	5.31
	CR	3.80	4.11	5.19	5.02	4.96	4.83
11th Grade	NC	5.21	5.77	5.41	5.82	4.82	5.20
	CR	3.51	3.95	4.64	4.45	4.94	4.88

NOTE: Lower numbers refer to greater discomfort, annoyance, and somatic-arousal.

Figure 1. Mean log skin conductance level of fourth grade children as a function of room size and sex. (N = 44)

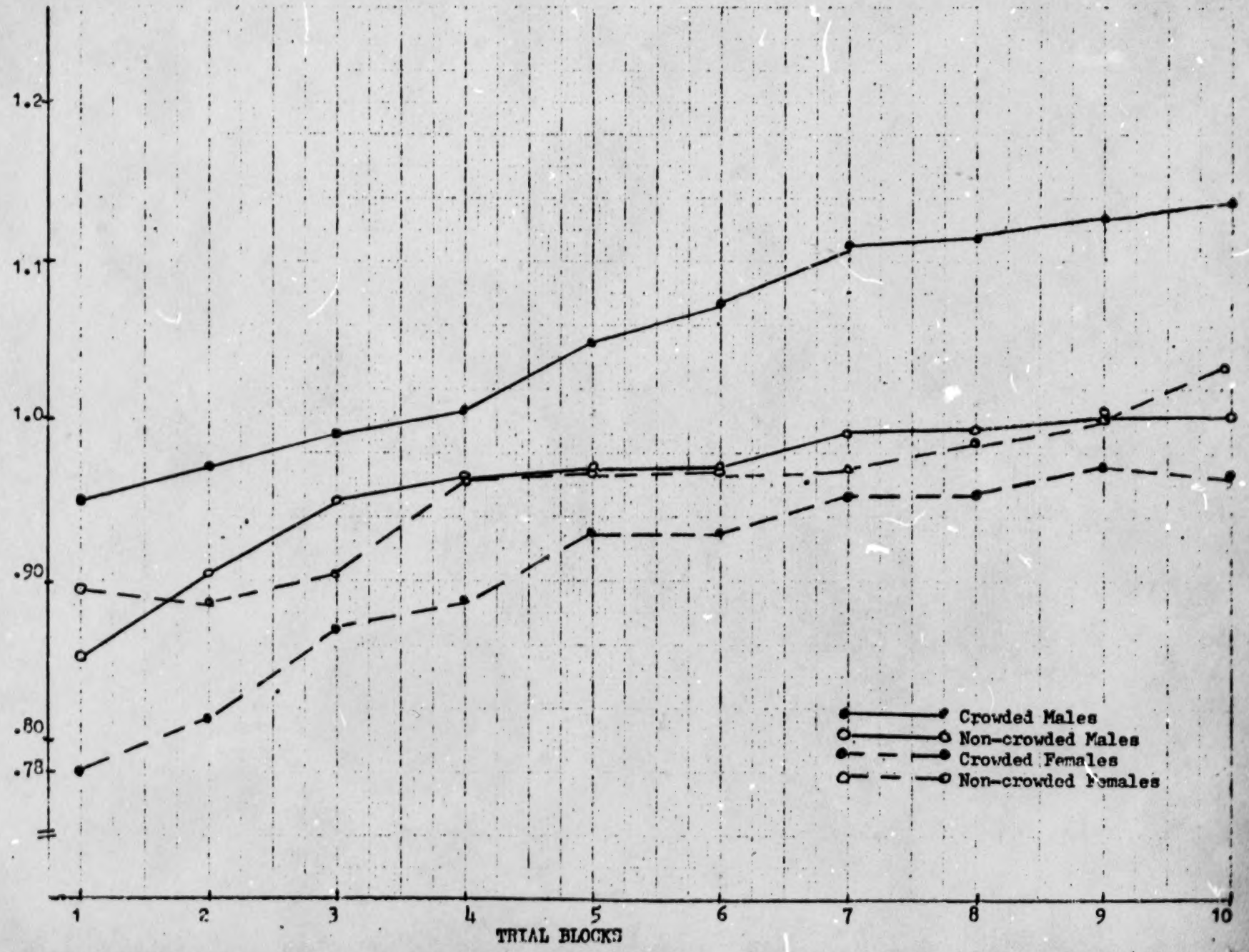

Figure 2. Mean log skin conductance level of eighth grade children as a function of room size and sex. (N = 52)

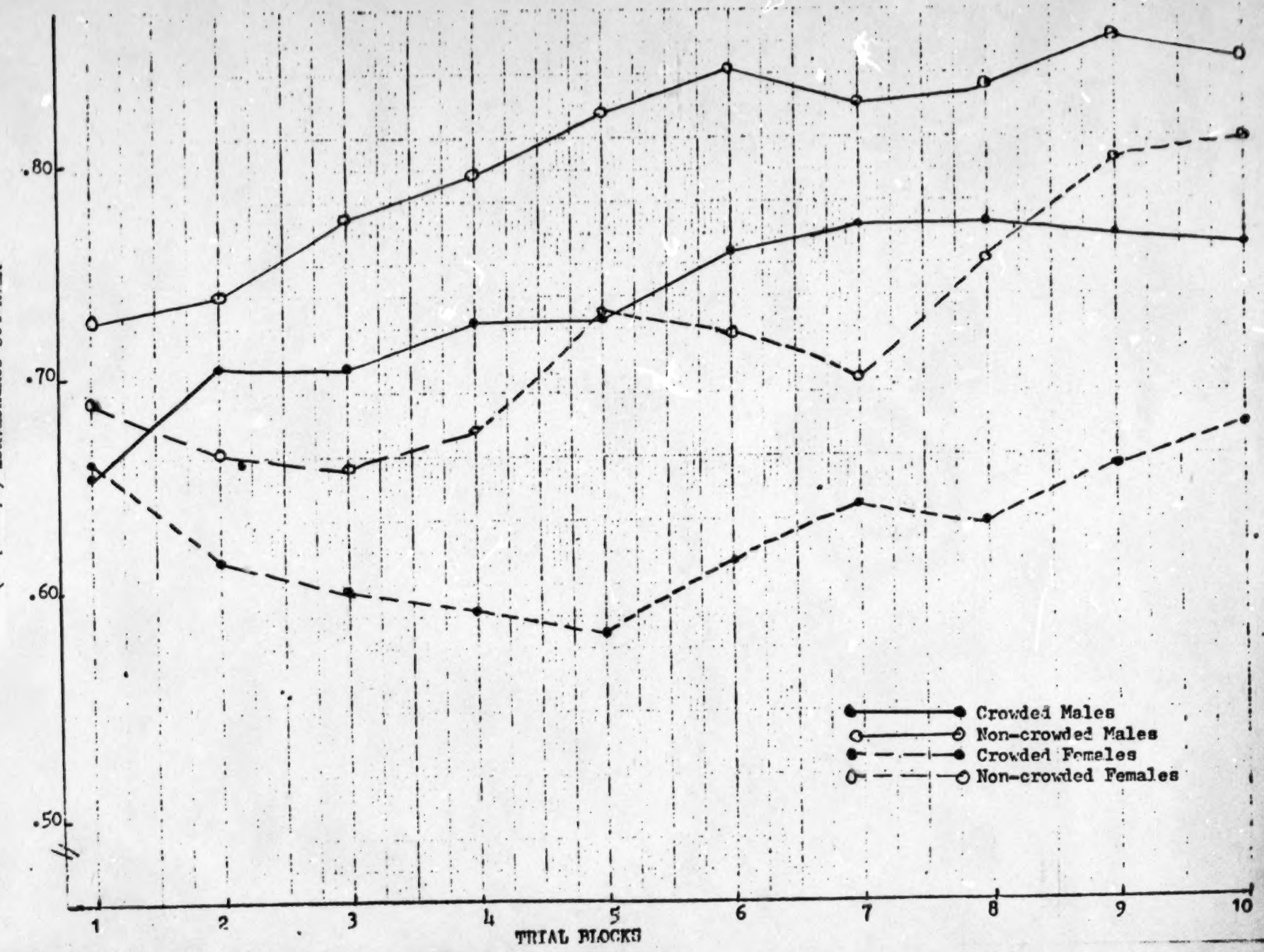

Figure 3. Mean log skin conductance level of eleventh grade children as a function of room size and sex.(N= 88)

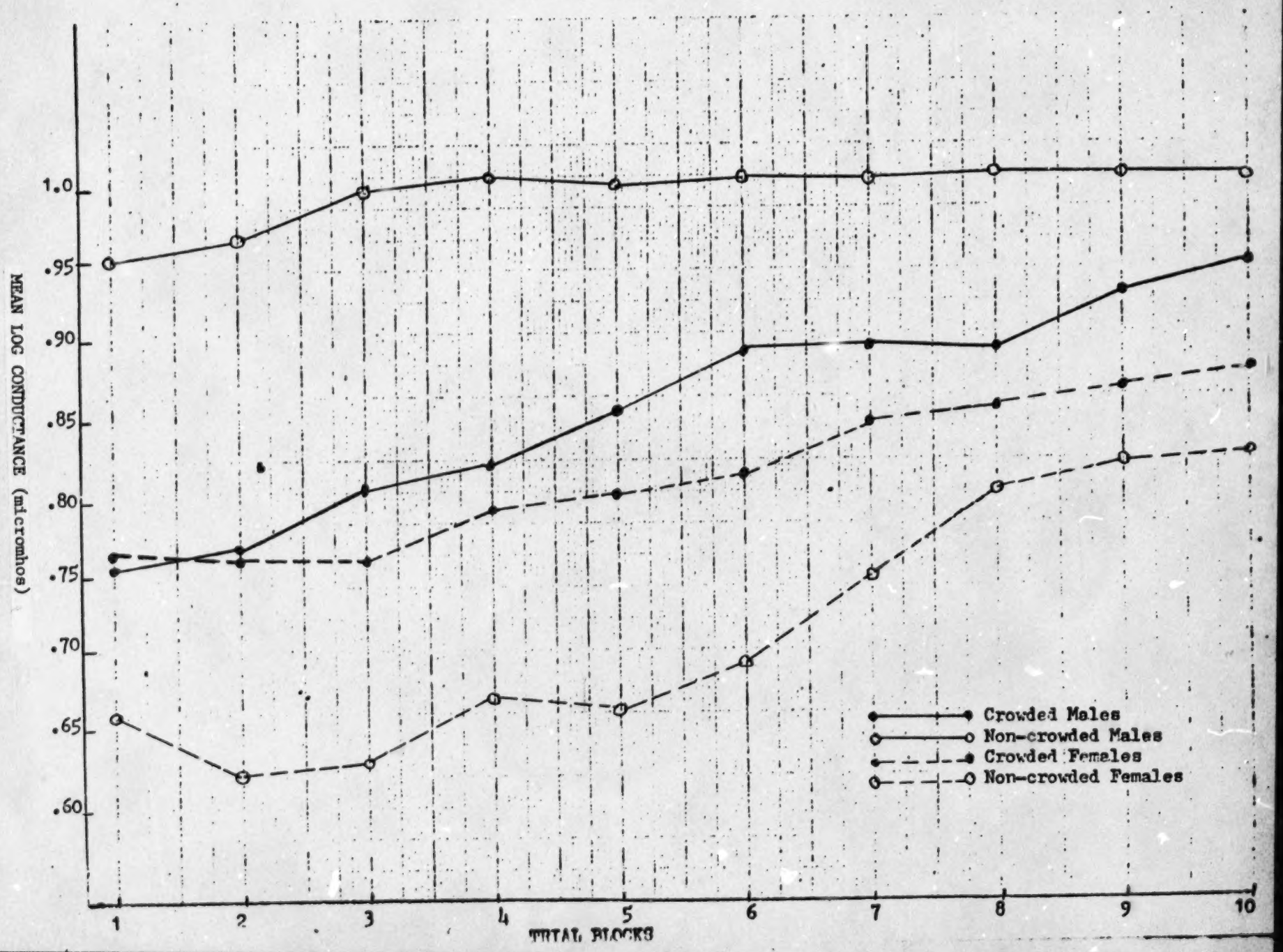

Figure 4. Mean log conductance level of elderly men and women as a function of room size. (N = 56)